

### **REMARKS**

Applicants provide the present Amendment to address the issues raised in the Official Action mailed October 28, 2004. Applicants appreciate the thorough review of the present application and the indication of withdrawal of the previous rejections.

While not specifically identified as responsive to the Supplemental Amendment Applicants filed July 28, 2004, the Official Action appears to address the claims as amended in the Supplemental Amendment and provided an initialed copy of the IDS that was submitted concurrently with the Supplemental Amendment. Accordingly, Applicants assume that the Examiner considered the Supplemental Amendment that clarified statements made in Applicants' previous Amendments regarding the Xu reference and that such Supplemental Amendment has been entered. If such is not the case, Applicants request that the Examiner indicate such in any subsequent communication.

Applicants have amended Claim 8 to clarify that the anneal is combined with another processing step that is not only an anneal.

#### **The IDS**

Applicants wish to bring to the Examiner's attention an IDS of materials that is being submitted concurrently herewith.

#### **The Section 112 Rejection**

Claim 8 stands rejected under 35 U.S.C. § 112, second paragraph, as being vague and indefinite. Applicants have cancelled Claim 8.

### **The Anticipation Rejections**

#### **Claims 6 and 7**

Claims 6 and 7 stand rejected as anticipated under 35 U.S.C. § 102(b) by Wang, Lou and Ma's "High Temperature Characteristics of High Quality SiC MIS Capacitors with O/N/O Gate Dielectric" (hereinafter "Wang et al."). Applicants have amended Claim 6 to incorporate the recitations of Claim 7 and have cancelled Claim 7. Applicants have amended Claim 6 to recite that the anneal is carried out in H<sub>2</sub> and/or NH<sub>3</sub>. The Official Action cites to the experiments section of Wang et al. as disclosing the recitations of Claim 6. Applicants submit that Wang et al. does not describe such an anneal but describes a water vapor anneal or formation of the nitride using SiH<sub>4</sub>. Accordingly, Applicants submit that Claim 6 is not anticipated by Wang et al.

#### **Claims 1, 3-4, 6, 9, 12 and 18-20**

Claims 1, 3-4, 6, 9, 12 and 18-20 stand rejected as anticipated under 35 U.S.C. § 102(b) by JP 2000-252461 A (hereinafter "JP '461"). Applicants have amended Claim 1 to incorporate the recitations of Claim 5 and Claim 5 has been cancelled. Accordingly, Applicants submit that the rejections of Claim 1 and Claims 3-4, 9, 12, 18 and 19 which depend from Claim 1, based on JP '461 have been obviated. Applicants have also amended Claim 6 to incorporate the recitations of Claim 7 and Claim 7 has been cancelled. Accordingly, Applicants submit that the rejection of Claim 6 based on JP '461 has been obviated.

With regard to the rejection of Claim 20, Applicants submit that Claim 20 is also not anticipated by JP '461. In particular, Claim 20 recites "nitriding the existing oxide layer on the 4H polytype silicon carbide layer with at least one of nitric oxide and/or nitrous oxide." Applicants submit that the cited portions of the computer translation of JP '461 do not disclose or suggest nitriding an existing oxide layer with nitric or nitrous oxide as recited in Claim 20. The Official Action does not appear to cite to any portion of JP '461 as disclosing or suggesting nitriding an existing oxide layer using nitric oxide and/or nitrous

oxide. Accordingly, Applicants submit that Claim 20 is not anticipated by the cited portions of JP '461 for at least these reasons.

Applicants note that the Official Action asserts that the priority documents of the present application do not provide support for the step of "fabricating a *nitrided* oxide layer." Applicants respectfully disagree. In particular, Application Serial No. 60/237,822 filed October 3, 2000 on page 2 describes an anneal of an existing oxide layer in N<sub>2</sub>O at a temperature of greater than 1100 °C. Likewise, the discussion on page 1 of growth of an oxide in N<sub>2</sub>O describes forming a nitrided oxide. Applicants submit that such a disclosure describes techniques for fabricating a nitrided oxide layer and, thus, with respect to the recitations of the claims directed to fabricating a nitrided oxide layer, Applicants submit that such recitations of the claims are supported by the priority documents.

### **The Obviousness Rejections**

#### **Claim 17**

Claim 17 stands rejected under 35 U.S.C. § 103 in light of JP '461. Applicants have cancelled Claim 17.

#### **Claims 1-5, 8-9, 12-14 and 16-20**

Claims 1-5, 8-9, 12-14 and 16-20 stand rejected under 35 U.S.C. § 103 as obvious in light of the combination of Xu *et al.* "Improved Performance and Reliability of N<sub>2</sub>O Grown Oxynitride on 6H-SiC" and JP '461. In light of the amendments discussed above, Applicants will address the rejections of Claim 5 and independent Claims 13 and 20. Applicants have cancelled Claim 8.

With regard to amended Claim 1, the Official Action cites to paragraphs 7 and 8 of JP '461 and asserts that 6H and 4H SiC materials provide similar and equivalent results. However, the cited portions of JP '461 neither disclose or suggest the growth or annealing of an oxide in N<sub>2</sub>O or NO as is recited in amended Claim 1. As such, JP '461 provides no teaching as to the effect on an N<sub>2</sub>O or NO grown or annealed oxide on 4H SiC or on 6H SiC

when the nitrided oxide is annealed in a hydrogen environment. All JP '461 teaches is that with respect to a hydrogen anneal, 6H or 4H SiC may be used as the substrate.

Furthermore, Applicants note that Xu et al. describes annealing in a forming gas at 410 °C. In contrast, JP '461 expressly teaches that temperatures below 600 °C will not work. See JP '461 paragraphs 24 and 25. Applicants submit that the combination of a reference that teaches an anneal at 410 °C with a reference that teaches that such an anneal "cannot still be used in fact" is an impermissible use of hindsight to pick and choose the teachings of the references.

Claim 13 recites "performing subsequent processing steps carried out at temperatures of about 400 °C or greater in a hydrogen containing environment." The Official Action does not appear to cite to any portion of Xu et al. or JP '461 as disclosing these recitations of Claim 13. Accordingly, Applicants submit that Claim 13 is patentable over the cited portions of Xu et al. and JP '461 for at least these reasons.

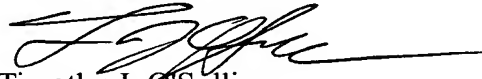
Claim 20 recites that the nitrided oxide is an annealed existing nitride. Applicants submit that analogous arguments to those discussed above with reference to amended Claim 1 may be made with respect to Claim 20. Furthermore, Applicants submit that Xu et al. actually teaches away from annealing an existing nitride in N<sub>2</sub>O. In particular, the N<sub>2</sub>ON sample of Xu et al., which is the sample of an oxide that is annealed after formation in N<sub>2</sub>O, is described as having deteriorated performance for p-type SiC. See Xu et al. "Results and Discussion". Furthermore, for n-type SiC, the N<sub>2</sub>ON sample is described as having "slightly improved C-V behavior." Xu et al., p. 299. However, this improvement is not attributed to the N<sub>2</sub>O anneal, but is attributed to the presence of nitrogen in the n-type substrate. Xu et al., p. 299. While Xu et al. does note that the N<sub>2</sub>ON samples exhibit smaller  $\Delta V_{fb}$  than the OX sample, the conclusion of Xu et al. is that N<sub>2</sub>O grown devices provide much smaller flat-band voltage shift than N<sub>2</sub>O-nitrided or thermal-oxide devices for 6H SiC. Xu et al., p. 300. As such, Applicants submit that Xu et al. teaches away from nitriding an existing oxide layer as recited in Claim 20. Accordingly, Applicants submit that Claim 20 is patentable over Xu et al. and JP '461 for at least these additional reasons.

In re: Das et al.  
Serial No.: 10/045,542  
Filed: October 26, 2001  
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**CONCLUSION**

Applicants submit that the present application is in condition for allowance, which action is respectfully requested. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (919) 854-1400.

Respectfully submitted,



Timothy J. O'Sullivan  
Registration No. 35,632

**Customer Number: 20792**

**CERTIFICATE OF MAILING**

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on January 28, 2005.



Traci A. Brown